

Remarks:

Status of Claims

Claims 1-14 were previously pending. Claims 2 and 4-14 are currently pending and claims 1 and 3 are currently amended with claims 1, 7, 11, and 14 being independent.

Office Action

The Examiner rejected claims 1-14 under 35 U.S.C. § 103(a) as being unpatentable over Setzer et al (U.S. Patent No. 6,676,784 B2) in view of Naumov et al (U.S. Patent No. 6,875,950 B2). Applicant respectfully submits that the prior art of record fails to disclose or suggest all claimed features of the present invention. Specifically, the Examiner's combination of Setzer and Naumov fails to disclose or suggest printing a circuit component onto an individual layer of substrate, as recited in claims 1, 7, 11, and 14, firing the individual layer and the circuit component printed thereon, as recited in claims 1, 7, 11, and 14, and applying a bonding agent to the individual layer of substrate and assembling the individual layer of substrate with one or more other layers of substrate, as recited in claims 1, 7, 11, and 14.

The Examiner's cited references fail to disclose or suggest printing a circuit component onto an individual layer of substrate.

Each independent claim of the present invention generally recites the feature of printing a circuit component onto an individual layer of substrate. Specifically, claim 1 recites the step of printing a circuit component onto an individual layer of substrate; claim 7 recites printing a circuit component onto an individual layer of thick film ceramic substrate; claim 11 recites screen-printing a plurality of circuit components onto a plurality of individual layers of thick film ceramic substrate; and claim 14 recites screen-printing a plurality of circuit components onto a plurality of individual layers of substrate.

Setzer does not disclose or suggest printing a circuit component on any layer of a substrate. Setzer discloses providing an electrical interconnect through multiple layers of ceramic substrate between an integrated circuit or some similar component and a chip package or printed circuit board or similar material. Setzer's process teaches a two-part structure – the universal monolith and the custom monolith, each comprised of at least one layer. These two pieces comprise only wiring paths and vias, with no components such as resistors (discussed in lines 6-55 of column 3), and are joined together to form the MLC substrate. Setzer describes that electrical components are attached to the top custom layer by way of electrical connectors, such as ball-grid arrays (BGA) or the like, as discussed in column 2, lines 62-65. But passive elements, i.e. circuit components, are not patterned or screen printed on the top layer or any other layer. The inclusion of Naumov in the Examiner's rejections does not cure Setzer's deficiencies as Naumov does not disclose printing a circuit component onto an individual layer of substrate either. Thus, no prior art of record discloses or suggests printing a circuit component onto an individual layer of substrate.

The Examiner's cited references fail to disclose or suggest firing the individual layer of substrate and the circuit component printed thereon.

All independent claims of the present invention also generally recite the feature of firing an individual layer of substrate with a circuit component printed thereon. Setzer does not disclose or suggest this feature. Instead, Setzer discusses manufacturing the layers (of the universal monolith and the custom monolith) in a number of ways, sintering each layer being among the methods, as described in column 4, lines 7-10. However, as discussed above, Setzer discloses that circuits components are attached only to the top layer of the custom monolith by means of a BGA or similar. As one skilled in the art would appreciate, this type of attachment is not suitable for firing or sintering without damage to the attached components or undesirable reflow of solder attachment metals, which does not occur with the present invention. Therefore, Setzer does not disclose firing components that are attached to the MLC as recited in claims 1, 7, 11, and 14; rather, any firing

proposed by Setzer must be performed before attaching any circuit components. Naumov's disclosure does not cover firing substrate layers either. Thus, no prior art of record discloses or suggests firing the individual layer and the circuit component printed thereon.

The Examiner's cited references fail to disclose or suggest applying a bonding agent to the individual layer of substrate and assembling the individual layer of substrate with one or more other layers of substrate.

All independent claims of the present invention additionally generally recite applying a bonding agent to an individual layer of substrate. For instance, claim 1 recites applying a bonding agent to the individual layer of substrate and assembling the individual layer of substrate with one or more other layers of substrate; claim 7 recites applying a bonding agent to the individual layer of thick film ceramic substrate and assembling the individual layer of thick film ceramic substrate with one or more other layers of thick film ceramic substrate; claim 11 recites applying a thick film glass bonding agent to the individual layers of thick film ceramic substrate and assembling the individual layers of thick film ceramic substrate; and claim 14 recites applying a thick film glass bonding agent to the individual layers of substrate and assembling the individual layers of substrate.

In the present invention, the bonding agent is treated as another layer in the layer stackup, such that a layer of bonding agent would be sandwiched between layers of substrate. Setzer does not disclose or suggest this feature, but instead discloses the process of forming ceramic green sheets or tape from line 56 of column 3 to line 3 of column 4. As one skilled in the art would be aware, the ceramic slurry includes polymer or organic binders in the mix to hold the substrate together. However, these binders are part of the mix and are not applied, thus Setzer does not disclose or suggest the application of a bonding agent to an individual layer as stated in claims 1, 7, 11, and 14. Naumov does not disclose applying a bonding agent to a stack of substrate layers either. Thus, no prior art of record discloses or suggests applying a bonding agent to the individual layer of substrate and assembling the individual layer of substrate with one or more other layers of substrate.

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Conclusion

In view of this response and the remarks herein, Applicants respectfully submit that claims 1-14 are in allowable condition and requests a corresponding Notice of Allowance. In the event of further questions, the Examiner is urged to call the undersigned. Any additional fee which might be due in connection with this application should be applied against our Deposit Account No. 19-0522.

Respectfully submitted,

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